Diversity of Aphidoidea in Rawalpindi Division (Punjab) Pakistan, with a list of host plant studied

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Abstract

Aphids were collected from different hosts in four districts of Rawalpindi Division (Punjab), Pakistan. A total of 700 specimens were collected, yielding eight species under eight genera. Details regarding valid names, body size, distribution and general body characters of collected specimens alongwith their host plants are discussed in this paper. Richness and abundance of species was also studied. Further surveys are needed to unhide the existing fauna of Aphidoidea from the area.

Keywords: *Diversity, Aphidoidea, Pakistan, Punjab, Rawalpindi.*

Introduction

Aphidoidea includes small soft bodied insects, commonly called aphids, blackflies, plant lice or greenflies. They are serious pests of crops, vegetables, ornamental plants and fruits. They suck cell sap and inject toxic saliva into plant tissues which may result in curling of leaves, appearance of discoloured spots on the foliage, blighting of buds and dimpling of fruits (Hashmi, 1994). Honey dew is released on plant leaves which results in development of sooty mould which hinders its photosynthesis (Blackman and Eastop, 2000).

In Pakistan, lot of work has been done on the biology and population dynamics of aphids but only fewer taxonomic studies were carried out uptill now. Taxonomy of Aphidoidea in Pakistan was studied by Das (1918), Munir (1953), Khaliq (1965), Awan (1973) and Nasir (1989). A need for comprehensive survey was felt and present study was under taken to make an authentic and updated record of Aphidoidea inhabiting Rawalpindi division of Punjab province, Pakistan.

Materials and Methods

Extensive sampling was done during the years (2007–2008) to collect adults of Aphidoidea. All the four districts i.e Rawalpindi, Chakwal, Jehlum and Attock with twenty localities (five from each district) were visited (Fig. 1). Details of collection sites is as follows:-

Rawalpindi Division (Punjab):

1) District Rawalpindi: Kahuta (L1), Mandra (L2), Gujar Khan (L3) Taxila (L4), Islamabad {NARC Research Farms (L5)}.
2) District Chakwal: Talagang (L6), Choa Syedan Shah (L7), Kallar Kahar (L8), Tman (L9), Mogla (L10).
3) District Jehlum: Dina (L11), Sohawa (L12), Mangla (L13), Pind Dadan Khan (L14), Khewra (L15).
4) District Attock: Hazro (L16), Hassan Abdal (L17), Fateh Jang (L18), Pindi Gheb (L19), Jand (L20).

Aphids were collected from cereal crops, grasses, vegetables, weeds and fruit trees with an ordinary camel hair brush, by jerking the plants on white paper sheet and by netting in some cases. Their search was followed by deep observation of symptoms on plants such as presence of coccinellids and other aphid predators, ant associations, rolling and yellowing of infested leaves and development of black sooty mold. They were brought to the laboratory of National Insect Museum and were preserved in 80% alcohol. After making their slides, specimens were identified following Eastop (1961), Stroyan (1977), Martin (1983), Blackman and Eastop (1994); and Blackman and Eastop (2000). Voucher specimens were deposited in National Insect Museum, NARC– Islamabad.

Results and Discussion

Thirteen different hosts grown in twenty five different localities of four districts of Rawalpindi division were sampled to collect adults of Aphidoidea. A total of 700 adult aphids were collected that provides a record of eight aphid species identified under eight genera. Details regarding valid names, body size, distribution, general appearance and host plants for collected species are presented (Table 1).

Richness of species was observed (Fig. 2), which shows presence of all the eight species in Rawalpindi district. However minimum number of species i.e five species were recorded from district Jehlum. Abundance of species was also studied (Table 2) showing *Lipaphis erysimi, Brevicoryne brassicae and Rhopalosiphum padi* as dominant and abundant species of Rawalpindi district and *Sitobion avenae and Metopolophium dirhodum* as common species of Jehlum district. However *Brevicoryne brassicae* also appeared to be a prevalent species of district Attock. *Prociphilus oleae* appears to be very rare and was recorded only from a single locality of Rawalpindi district. Due to huge diversity in topography and flora of the area, further surveys can add more species of Aphidoidea.

To study the diversity of Aphidoidea in each area, diversity index following Menhinick (1964) was calcultaed (Fig. 3) which shows highest aphid diversity in district Chakwal however minimum was calculated for Attock. District Chakwal is rich in flora and almost all the major crops and a wide variety of vegetables and grasses are grown here, which may be a possible reason for higher aphid diversity in this area. In contrast to this Jhelum is less fertile and more mountainous as compared to Chakwal, which favours less development of Aphidoidea due to host unavailability.

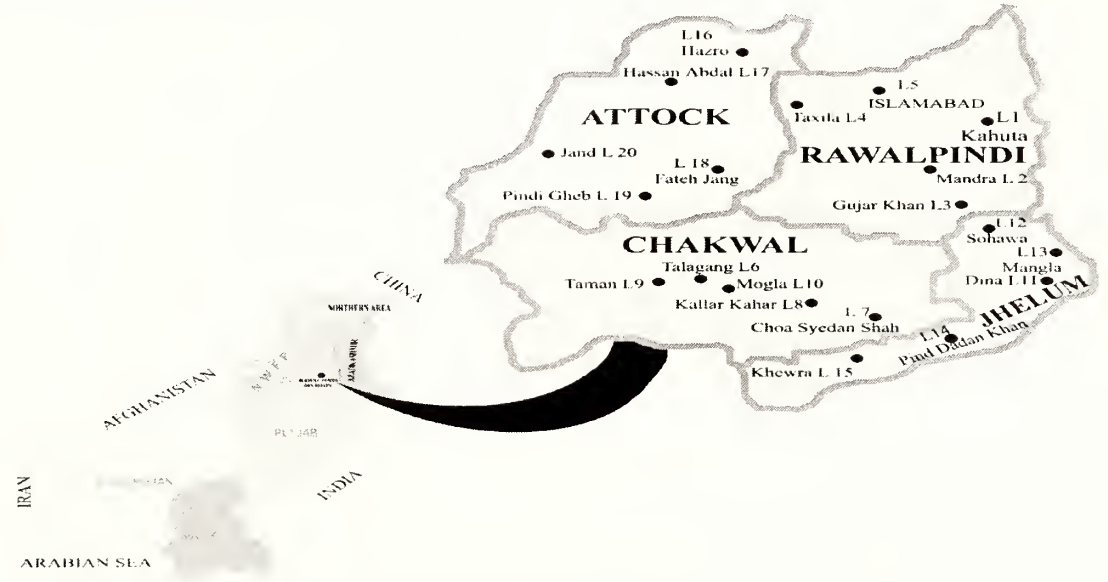

Fig.1 : Map of Pakistan showing Rawalpindi Division with its four districts along with sites of collection for Aphidoidea.

Table-1: Details regarding collected Aphidoidea of Rawalpindi Division (Punjab), Pakistan.

S.No.	Scientific Names	Measurement	General Appearance	Distribution	Host Plant Studied
1.	*Acrythosiphon pisum* (Harris, 1776)	Apterate: 2.3–4.3mm Alatae: 2.5–4.4mm	Greenish to pink colour, with slendrical appendages.	L4, L5, L10, L16, L17.	Pea plants (*Pisum sativum*).
2.	*Aphis gossypii* (Glover, 1925)	Apterate: 1.0–1.8mm Alatae: 1.2–1.8mm	Dark green to almost blackish in old specimens, however pale yellow to whitish under crowded colonies. Siphunculi darker with cauda pale in appearance.	L5, L16, L17.	Guava *(Psidium guajava),* Potato *(Solanum tuberosum).*
3.	*Brevicoryne brassicae* (Linnaeus, 1758)	Apterate: 1.6–2.6mm Alatae: 1.6–2.8mm	Greyish green to dull mild green with head and dorsal markings on thorax and abdomen darker. Body is medium sized covered with greyish white mealy wax.	L1, L3, L4, L5, L8,L14, L16, L17, L18, L20.	Cabbage and Cauliflower (*Brassica oleracea*), Radish (*Raphanus sativus*), Mustard (*Brassica campestris*).
4.	*Lipaphis erysimi* (Kaltenbach,1843)	Apterate: 1.4–2.4mm Alatae: 1.4–2.2mm	Yellowish green to duskey green or grey green in colour. Coated with wax under humid conditions. Dark conspicuous sclerites present on abdomen laterally.	L2, L3, L4, L5, L6, L9, L10, L11, L14, L18, L19, L20.	Mustard (*Brassica campestris*), Wheat (*Triticum aestivum*), Maize (*Zea mays*).
5.	*Metopolophium dirhodum* (Walker, 1849)	Apterate: 1.6–2.9mm Alatae: 1.6–2.3mm	Green or yellowish green, with bright green longitudinal mid dorsal stripes. Body is elongated spindle shaped	L4, L5, L6, L9, L13, L15, L16, L18, L20.	Rose plantantions, Wheat (*Triticum aestivum*), Sudan grass (*Sorgum sudanensis*), Baru (*Sorghum helipense*).

Table-1: continued.

S.No.	Scientific Names	Measurement	General Appearance	Distribution	Host Plant Studied
6.	*Prociphilus oleae* (Leach ex Risso, 1826)	Apterate: 1.8–3.0mm Alatae: 1.7–2.9mm	Greenish to darker in colour, elongated, with hind tarsi greatly elongate, siphunculi present as flat pigmented cone.	L5.	Olive plantations (*Olea europea*).
7.	*Rhopalosiphum padi* (Linnaeus, 1758)	Apterate: 1.5-2.1mm Alatae: 1.6-2.0mm	Molted yellowish green, olive green, greenish black. Small to medium sized with broadly oval shaped body.	L2, L3, L4, L5, L6, L9, L10, L11, L14, L18, L19, L20.	Sudan grass (*Sorgum sudanensis*), Baru (*Sorghum helipense*), Khabal grass (*Cynodon dactylon)*, Mustard (*Brassica campestris*), Wheat (*Triticum aestivum*), Maize (*Zea mays*), Sorghum (*Sorghum vulagare*).
8.	*Sitobion avenae* (Fabricius, 1775)	Apterate: 1.3–3.3mm Alatae: 1.6–2.9mm	Yellowish green, dirty reddish brown to shiny reddish brown, uniform sclerites present on dorsal side of abdomen.	L1, L4, L5, L7, L9, L10, L11, L12, L13, L15.	Sudan grass (*Sorgum sudanensis*), Baru (*Sorghum helipense*), Maize (*Zea mays*), Millets (*Pennisetum glaucum and P. typhoides*), Mustard (*Brassica campestris*), Wheat (*Triticum aestivum*), Rice (*Oryza sativa*).

Table-2: Abundance of Aphidoidea in Rawalpindi Division (Punjab), Pakistan.

Species Recorded	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20
Acrythosiphon pisum (Harris, 1776)	-	-	-	+	+	-	-	-	-	+	-	-	-	-	-	+	+	-	-	-
Aphis gossypii (Glover, 1925)	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-
Brevicoryne brassicae (Linnaeus, 1758)	+	-	+	+	+	-	-	+	-	-	-	-	-	+	-	+	+	+	-	+
Lipaphis erysimi (Kaltenbach, 1843)	-	+	+	+	+	+	-	-	+	+	+	-	-	+	-	-	-	+	+	+
Metopolophium dirhodum (Walker, 1849)	-	-	-	+	+	+	-	-	+	-	-	-	+	-	+	+	-	+	-	+
Prociphilus oleae (Leach ex Risso, 1826)	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhopalosiphum padi (Linnaeus, 1758)	-	+	+	+	+	+	-	-	+	+	+	-	-	+	-	-	-	+	+	+
Sitobion avenae (Fabricius, 1775)	+	-	-	+	+	-	+	-	+	+	+	+	+	-	+	-	-	-	-	-

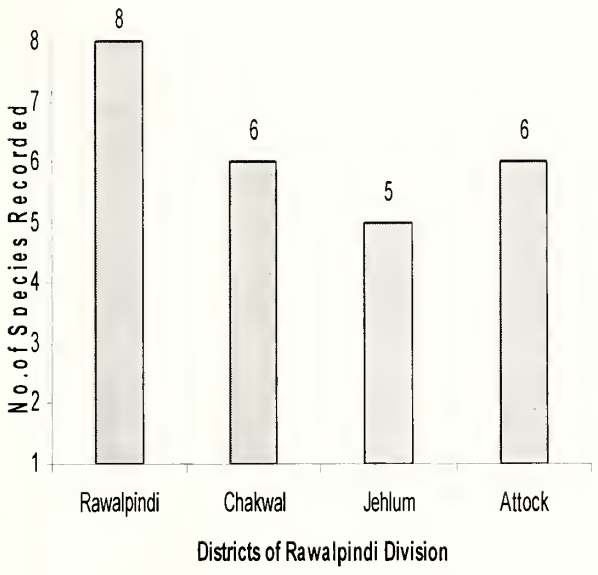

Fig. 2: Richness of Aphidoidea in Rawalpindi Division (Punjab), Pakistan.

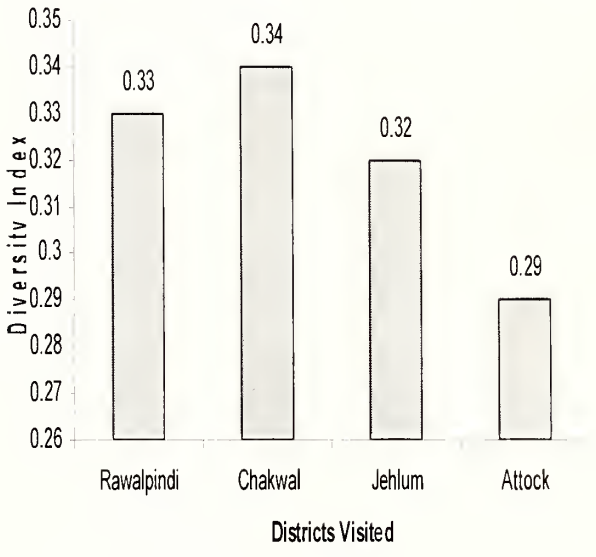

Fig. 3: Diversity Index Calculated

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